

What is Claimed is:

1. A trip unit comprising:
 - a housing;
 - a plunger mounted with respect to said housing, said plunger having a first position, a second position and a third position;
 - means for latching said plunger in said first position, for releasing said plunger from said first position to said second position, and for re-latching said plunger in said first position;
 - means for biasing said plunger to said second position;
 - a trip lever pivotally mounted with respect to said housing, said trip lever including a first surface, a second surface and a third surface; and
 - a trip actuator including a member having a first position, a second position and a third position, which resets said trip actuator, the first position of the member of said trip actuator corresponding to the first position of said plunger, the second position of the member of said trip actuator engaging the first surface of said trip lever and rotating said trip lever in a first rotational direction, in order to engage said means for latching with the second surface of said trip lever and to release said plunger from said first position, said plunger engaging the third surface of said trip lever at about the third position of said plunger and rotating said trip lever in an opposite second rotational direction, in order to engage the first surface of said trip lever with the member of said trip actuator and to move said member to the third position thereof.
2. The trip unit of Claim 1 wherein said housing includes an opening; wherein said plunger is a rotary plunger which is pivotally mounted to said housing, said rotary plunger being pivoted from the opening of said housing in the second position of said rotary plunger, the first position of said rotary plunger being intermediate the second and third positions thereof, said rotary plunger being pivoted into said opening in the third position of said rotary plunger; and wherein as said rotary plunger pivots from the second position to the third position thereof, said rotary plunger rotates said trip lever to reset said trip actuator.
3. The trip unit of Claim 2 wherein said rotary plunger includes a latch surface and a cam surface; wherein said means for latching said plunger includes

a trip bar having a tab which engages said latch surface in the first position of said rotary plunger, said tab engaging said cam surface as said rotary plunger rotates toward the third position thereof, said cam surface releasing said tab at about the third position of said rotary plunger; and wherein said tab re-engages said latch surface as said rotary plunger rotates from the third position to the first position thereof.

4. The trip unit of Claim 1 wherein said trip lever is pivotally mounted on a first axis; and wherein said means for latching said plunger is a trip bar, which is pivotally mounted on a second axis, said second axis being normal to said first axis.

5. The trip unit of Claim 4 wherein when said trip lever rotates in the first rotational direction the second surface of said trip lever engages and rotates said trip bar in a third rotational direction, which is normal to said first and second rotational directions.

6. The trip unit of Claim 5 wherein said trip bar includes a first tab, which is engaged by the second surface of said trip lever, a second tab, which latches and releases said plunger, a third tab and a spring biasing said third tab with respect to said housing, in order to bias said trip bar to pivot in a fourth rotational direction, which is opposite said third rotational direction.

7. The trip unit of Claim 1 wherein said housing includes a surface having an opening; and wherein said plunger is a rotary plunger including a surface, said rotary plunger being pivotally mounted to said housing, said rotary plunger being pivoted from the opening of the surface of said housing in the second position of said rotary plunger, the surface of said rotary plunger being substantially flush to the surface of said housing in the first position of said rotary plunger, the surface of said rotary plunger being pivoted into said opening in the third position of said rotary plunger.

8. The trip unit of Claim 1 wherein said trip actuator is a solenoid including a magnet; wherein the member of said solenoid is an armature; and wherein said magnet attracts said armature in the third position of said trip actuator in order to reset said trip actuator.

9. The trip unit of Claim 1 wherein said plunger is a rotary plunger, which is pivotally mounted with respect to said housing; wherein said rotary

plunger includes a latch surface within said housing; and wherein said means for latching is a trip bar including a tab, which engages the latch surface of said rotary plunger, in order to latch said rotary plunger in the first position thereof.

10. The trip unit of Claim 1 wherein said means for latching said plunger is a trip bar pivotally mounted within said housing, said trip bar including a tab; and wherein said trip actuator further includes a linear plunger engaging said trip lever, in order to rotate said trip lever to engage the tab of said trip bar.

11. The trip unit of Claim 10 wherein the tab of said trip bar is a first tab; wherein said trip lever engages the first tab of said trip bar, in order to pivot said trip bar in a third rotational direction; and wherein said trip bar further includes a second tab and a spring biasing said second tab with respect to said housing, in order to bias said trip bar to pivot in an opposite fourth rotational direction.

12. The trip unit of Claim 1 wherein said plunger is a rotary plunger including a first pivot engaging said housing; and wherein said means for biasing said plunger to said second position includes a second pivot engaging said rotary plunger at a position offset from said first pivot, a member engaging said housing at a position offset from said first pivot, and at least one spring disposed between said second pivot and the member of said means for biasing said plunger.

13. The trip unit of Claim 12 wherein each of said second pivot and the member of said means for biasing said plunger includes a first end and a second end; and wherein said at least one spring is a first spring engaging the first ends of said second pivot and the member of said means for biasing said plunger, and a second spring engaging the second ends of said second pivot and the member of said means for biasing said plunger.

14. The trip unit of Claim 13 wherein said plunger includes a portion, which is outside of said housing in the second position of said plunger, the portion of said plunger being generally pie-slice shaped and having a first sub-portion with a first radius and a second sub-portion with a smaller second radius, said first sub-portion being adapted to engage a latch of a circuit breaker frame.

15. A trip unit comprising:
a housing;

a plunger mounted with respect to said housing, said plunger having a first position, a second position and a third position;

a trip bar pivotally mounted with respect to said housing, said trip bar latching said plunger in said first position, releasing said plunger from said first position to said second position and re-latching said plunger in said first position;

a spring mechanism biasing said plunger to said second position;

a trip lever pivotally mounted with respect to said housing, said trip lever including a first surface, a second surface and a third surface; and

a trip actuator including a member having a first position, a second position and a third position, which resets said trip actuator, the first position of the member of said trip actuator corresponding to the first position of said plunger, the second position of the member of said trip actuator engaging the first surface of said trip lever and rotating said trip lever in a first rotational direction, in order to engage said trip bar with the second surface of said trip lever and to release said plunger from said first position, said plunger engaging the third surface of said trip lever at about the third position of said plunger and rotating said trip lever in an opposite second rotational direction, in order to engage the first surface of said trip lever with the member of said trip actuator and to move said member to the third position thereof.

16. The trip unit of Claim 15 wherein said housing includes an opening; wherein said plunger is a rotary plunger which is pivotally mounted to said housing, said rotary plunger being pivoted from the opening of said housing in the second position of said rotary plunger, the first position of said rotary plunger being intermediate the second and third positions thereof, said rotary plunger being pivoted into said opening in the third position of said rotary plunger; and wherein as said rotary plunger pivots from the second position to the third position thereof, said rotary plunger rotates said trip lever to reset said trip actuator.

17. The trip unit of Claim 15 wherein said rotary plunger includes a latch surface and a cam surface; wherein said trip bar includes a tab which engages said latch surface in the first position of said rotary plunger, said tab engaging said cam surface as said rotary plunger rotates toward the third position thereof, said cam

surface releasing said tab at about the third position of said rotary plunger; and wherein said tab re-engages said latch surface as said rotary plunger rotates from the third position to the first position thereof.

18. A trip unit comprising:
 - a housing;
 - a plurality of line end terminals;
 - a plurality of conductors;
 - a plurality of load end terminals, each of said load end terminals electrically connected to a corresponding one of said line end terminals by a corresponding one of said conductors;
 - an electronic trip circuit within said housing, said electronic trip circuit comprising:
 - a plurality of current transformers each of which is disposed about a corresponding one of said conductors, each of said current transformers including an output, and
 - a trip circuit including a plurality of inputs electrically connected to the outputs of said current transformers, said trip circuit also including an output having a signal;
 - a plunger mounted with respect to said housing, said plunger having a first position, a second position and a third position;
 - a trip bar pivotally mounted within said housing, said trip bar latching said plunger in said first position, releasing said plunger from said first position to said second position and re-latching said plunger in said first position;
 - a spring mechanism within said housing biasing said plunger to said second position;
 - a trip lever pivotally mounted within said housing, said trip lever including a first surface, a second surface and a third surface; and
 - a flux shunt trip actuator within said housing, said flux shunt trip actuator including an input electrically connected to the output of said trip circuit, said flux shunt trip actuator also including a member having a first position, a second position and a third position, which resets said flux shunt trip actuator, the first position of the member of said flux shunt trip actuator corresponding to the first

position of said plunger, the second position of the member of said flux shunt trip actuator engaging the first surface of said trip lever and rotating said trip lever in a first rotational direction in response to the signal of the output of said trip circuit, in order to engage said trip bar with the second surface of said trip lever and to release said plunger from said first position, said plunger engaging the third surface of said trip lever at about the third position of said plunger and rotating said trip lever in an opposite second rotational direction, in order to engage the first surface of said trip lever with the member of said flux shunt trip actuator and to move said member to the third position thereof.

19. The trip unit of Claim 18 wherein said flux shunt trip actuator further includes a magnet; and wherein the member of said flux shunt trip actuator is an armature, which is held in the first position of said flux shunt trip actuator by said magnet.

20. The trip unit of Claim 19 wherein said flux shunt trip actuator further includes a spring, which biases said armature toward the second position of said flux shunt trip actuator.

21. The trip unit of Claim 20 wherein the magnet of said flux shunt trip actuator attracts and holds said armature when said armature moves from the second position to the third position of said flux shunt trip actuator.

22. The trip unit of Claim 18 wherein said trip bar includes a first tab, which is engaged by the second surface of said trip lever to rotate said trip bar in a third rotational direction, a second tab, which latches and releases said plunger, a third tab and a spring biasing said third tab with respect to said housing, in order to bias said trip bar to pivot in an opposite fourth rotational direction.

23. The trip unit of Claim 22 wherein said trip bar further includes a fourth tab; and wherein said housing receives an earth leakage member, which engages the fourth tab to rotate said trip bar in said third rotational direction.

24. The trip unit of Claim 22 wherein said trip bar further includes a fourth tab; and wherein said housing receives an attachment member, which engages the fourth tab to rotate said trip bar in said third rotational direction.